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(54) Gaming machines

(57) A gaming machine permits the user to play games throughout a predetermined period which is dependent upon the amount of payment made by the user. A variable number of games may be played during this period. Credit won by playing a game can be converted into a further playing period, and any non-used playing time can be converted into credit. The playing period may be discontinuous, to allow the user intervals in which certain operations can be performed.

Fig.1.

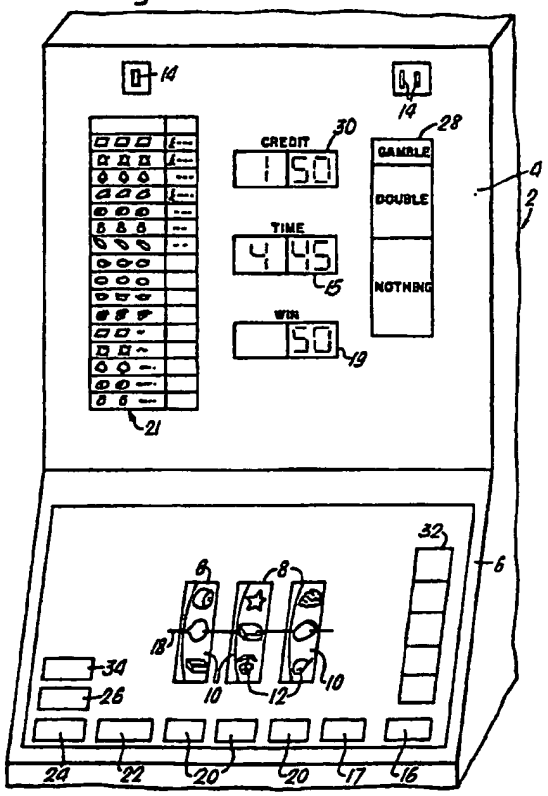

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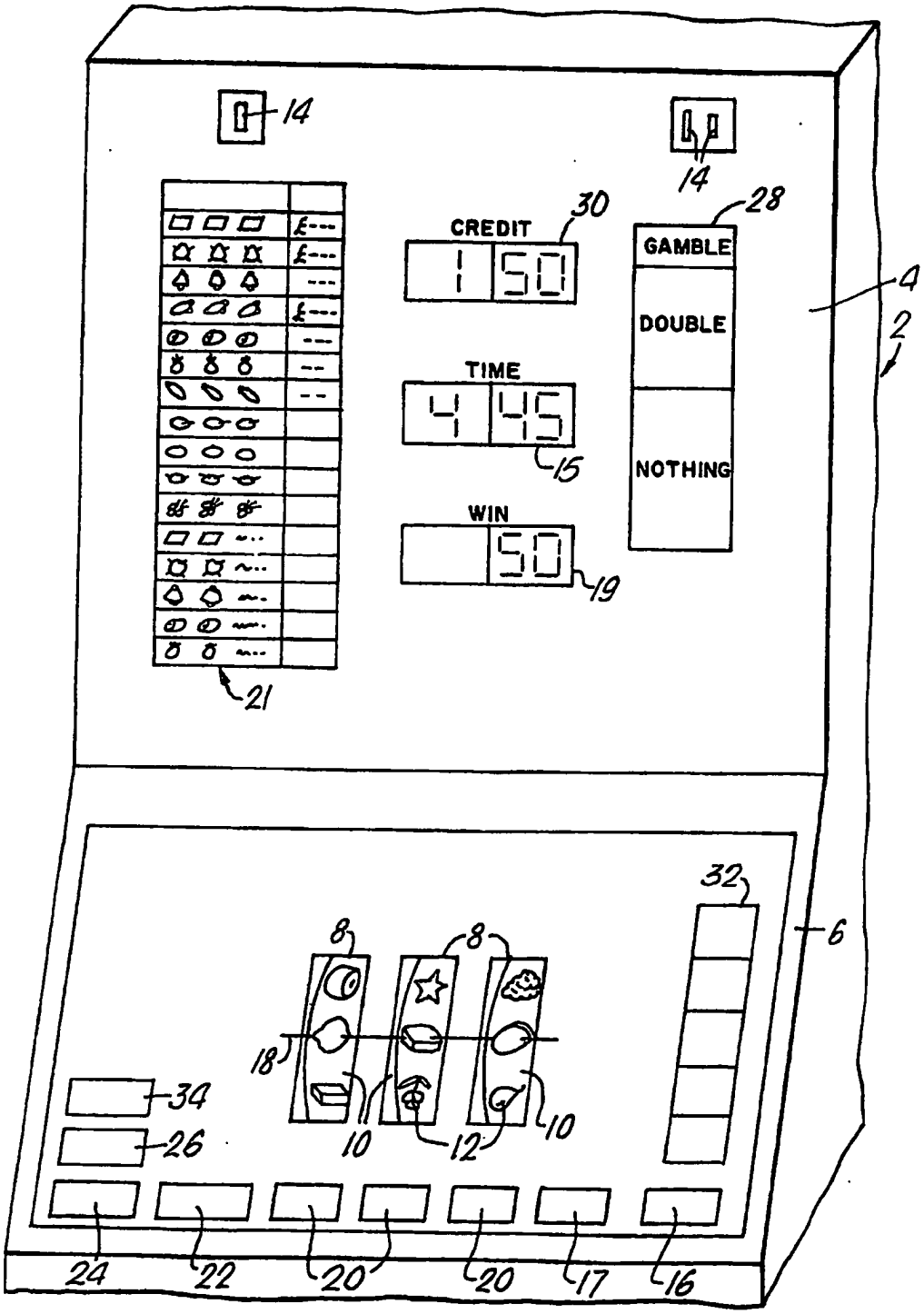
Fig. 1.



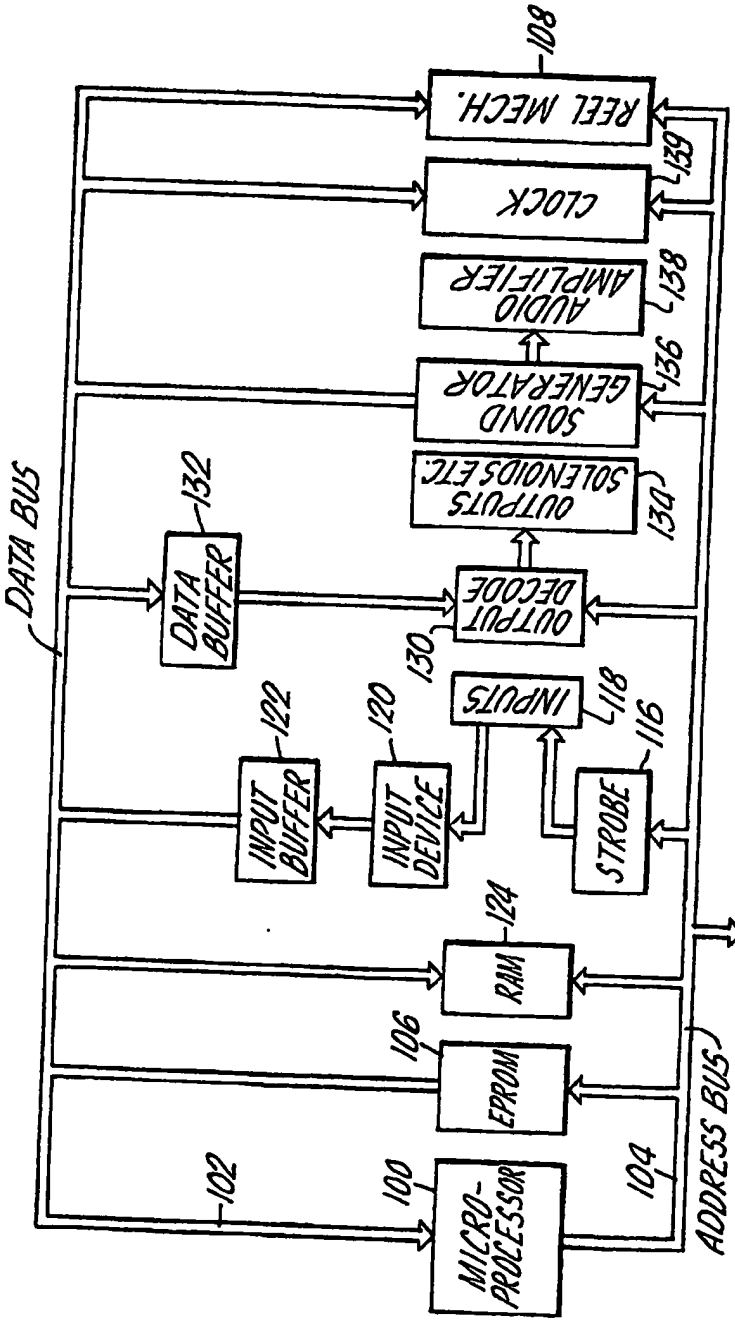

MICRO-PROCESSOR
100
102
EPROM
106
RAM
124
104
ADDRESS BUS
DECODE
140
STROBE
116
INPUT DEVICE
120
INPUT BUFFER
122
INPUTS
118
130
DATA BUS
DATA BUFFER
132
OUTPUT DECODE
OUTPUTS SOLENOIDS ETC.
134
SOUND GENERATOR
136
AUDIO AMPLIFIER
138
CLOCK
139
REEL MECH.
108

Fig. 2.

SPECIFICATION

Gaming machines

This invention relates to gaming machines, which term is used herein to refer to any device by means of which a user can play a game and, depending upon the results of the game, obtain a credit value. The machine preferably pays out cash and/or tokens in an amount corresponding to the credit value.

In the art, those machines which pay out only cash are referred to as "gaming machines". Herein, however, the term gaming machine is used in a generic sense, as the invention is applicable also to other types of machines such as those known as "amusement with prize" machines, which pay out both cash and tokens. The invention is particularly but not exclusively applicable to machines known as "fruit machines", which generally incorporate symbol-carrying reels which are spun during the playing of a game so as to alter in a random or psuedo-random manner the combination of symbols which can be viewed by the user. The invention is also applicable to machines which incorporate other forms of display, such as a panel carrying symbols which are selectively illuminated during the playing of a game, or a video display screen which may display symbols such as playing cards or which may form part of a fruit machine which has simulated reels displayed on the screen. Patent Specification GB-A-2,117,155, for example, describes a machine to which the present invention can be applied.

It would be desirable to provide an improved gaming machine which is more attractive to potential players, and which is so designed as to encourage use of the machine.

According to one aspect of the invention there is provided a gaming machine which allows a user to play games for a predetermined amount of time, and wherein the duration of a game and/or the interval between games may vary, so that the total number of games played within the allowed amount of time may vary.

According to another aspect of the invention there is provided a gaming machine which has means whereby a user can stop one game to permit the playing of a succeeding game, the machine being arranged to allow the user a predetermined amount of time within which to play games, so that the number of games played within the allowed amount of time will depend at least in part on how the user operates the stop means.

The invention is to a large extent directed to the idea of allowing a user a playing-time period within which an indefinite number of games may be played, in contrast with the conventional arrangement in which the number of games a user is allowed to play is predetermined so that for example by paying a certain amount, the user is allowed a single game.

It is preferred that the number of games played within the allowed amount of time be determined at least in part by how the user operates the machine. For this purpose, the machine preferably has means (such as a "stop" button) for allowing the user to terminate one game and thus enable the machine to proceed with a succeeding game which can take place either automatically or in response to an action by the user (for example the pressing of a "start" button).

Such an arrangement is particularly desirable because the user will be encouraged to develop his skills in operating the machine in the hope of being able to increase the number of games he plays within the allowed time and thereby increase the number of opportunities to obtain a winning result.

However, this arrangement is not essential. Instead, the machine could be arranged to halt successive games automatically so that the user merely has to start the succeeding game, or indeed the machine could both stop and start the successive games automatically. In these situations the length of the game and/or the interval between games (or at least minimum values for these periods) are preferably determined on a random or pseudo-random basis by the machine.

In any of the above arrangements, the invention provides a machine so arranged that a player will wish the games to be played as quickly as possible in order to increase the number of opportunities to obtain a winning result, and this will tend to increase the overall useage of the machine.

In the preferred embodiment, a predetermined amount of playing time is obtained by making a payment equal to a certain value. This payment may be made by the insertion of one or more coins or tokens into the machine, although this is not essential. By making a larger payment, more playing time is allowed.

In an alternative embodiment, the machine normally performs in the conventional manner, so that the number of games played is determined only by the amount of payment made by the player, but on certain occasions a "timed play" feature comes into operation. This may occur on random or pseudo-random occasions, possibly before or after a conventional game, or may occur when a certain result has been achieved by the playing of a game. Upon occurrence of the feature, the user is allowed a certain amount of time within which an indefinite number of games are played, following which the operation of the machine reverts to that of conventional machines.

The machine preferably has a display for indicating the passage of time during the al-

lowed playing time. This display, which is preferably numeric, may either indicate elapsed time since the beginning of the playing period, or the time remaining to the end of the playing period.

The machine may of course incorporate various additional features such as are found in conventional machines and which are brought into play upon certain occasions which may be determined randomly or pseudorandomly, or as a consequence of a certain result having been achieved by the playing of a game. Such features may include a "gamble" feature whereby the results of a win, which would normally be one of several predetermined credit values, can be gambled in an attempt to increase the amount won. If the machine is a fruit machine, the features may include a "nudge" feature whereby one or more of the reels of the machine are selectively indexed in order to change the symbols displayed in the hope of achieving the display of a winning symbol or combination of symbols. There could also be a "hold" feature whereby a user may select certain reels so that those selected reels are not spun during the subsequent playing of a game.

If desired, in a fruit machine according to the invention, the arrangement may be such that each time a game is played during the playing period (or possibly each time except for the first) the user may select which reels are spun during the subsequent playing of a game. This could act as an added incentive, in that the user may be able gradually to build up a winning combination of symbols by the playing of successive games during the allowed playing period.

The allowed playing period need not be continuous. For example the allowed playing time may be split into different periods separated by intervals which do not count toward the playing time. Such an interval may commence automatically; for example, the counting of the elapsed playing time may halt automatically when the user obtains a win so that he may be allowed as much time as he likes to use an optional feature such as the gamble feature referred to above, following which the counting of the allowed playing time may recommence automatically. Alternatively, or additionally, there may be occasions on which the user can halt the counting of the playing time only by operating the machine in a required manner, such as by pressing a "stop-the-clock" button. This is preferably only possible during the period between games, and is preferably only allowable so that a certain particular action (such as the use of one of the optional features referred to above) can be taken at leisure. Once the action has been taken, the machine preferably automatically recommences the counting of the playing time.

The machine may be arranged so that the playing time can be affected by various events. For example, time bonuses or penalties may be awarded on random or pseudo-random occasions, or as a consequence of a certain result having been achieved by the playing of a game. Alternatively, or additionally, there may be a "time gamble" option whereby a user may gamble his allowed playing time, so that the time is either increased or decreased as a result of a random or pseudo-random gambling operation. In the latter case, the counting of the elapsed game-playing time may be halted while the time gamble option is being used.

The counting of the playing time may start upon insertion of a coin or token, or alternatively may start when the user first initiates the playing of a game. At the end of the allowed playing time, the machine could be arranged so as to cancel any game which is presently in progress, or to terminate the game so that a result is achieved.

An arrangement embodying the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a gaming machine in accordance with the invention, and

Figure 2 is a block diagram of the circuitry of the machine.

The specific embodiment to be described is a version of the well-known "fruit machine". Many examples of such machines are readily available, and the way in which they operate is well-known to those familar with the art.

Referring to Figure 1, the machine 2 has a vertical facia 4 and an inclined facia 6. The facia 6 has three apertures 8, which reveal portions of the circumferences of three reels 10 which are mounted for rotation about a common horizontal axis. The reels carry symbols such as those shown at 12 on their peripheries, some of the symbols being visible through the apertures 8.

The machine can be played by inserting one or more coins or tokens through appropriate slots 14. This causes a time display region 15 on the facia 4 to display numerically a permitted amount of game-playing time, in terms of units and hundredths of a second, which is calculated in accordance with the value deposited by insertion of the coins or tokens. For example, 3 seconds may be permitted for each 10p inserted.

An individual game may then be played by pressing a start button 16. As soon as this is done, the machine starts to count down time, and to cause the display region 15 to indicate the decreasing amount of time. The pressing of button 16 also causes the reels 10 to spin, which is preferably achieved by using a stepper motor for each reel. The reels are then stopped by the user operating a stop button 17. If the reels are positioned such that certain symbols are aligned along a win line 18, the user is accorded with a win value. A win

display region 19 on the facia 4 shows the amount won. A table 21 on the facia 4 shows the possible win values which can be achieved as a result of different combinations of symbols appearing on the win line 18.

Occasionally, a "hold" feature is provided whereby the user is given the opportunity at the beginning of a game to press one or more hold buttons 20, which will prevent, during the subsequent reel-spinning operation, the spinning of each reel associated with a hold button which has been pressed. There is a cancel button 22 for cancelling the selection of reels using the hold buttons to permit a different selection before the reel-spinning operation.

A "gamble" feature is provided each time the user obtains a winning result, whereby the user can choose either to be credited with his winnings by pressing a collect button 24 or to enter a gamble mode, as a result of which his win value may be increased or decreased, by pressing a gamble button 26. In the latter case, a gamble display region 28 on the upper facia 4 is operated so as repeatedly and successively to illuminate subregions labelled "DOUBLE" and "NOTHING". This takes place for a time determined on a random or pseudo-random basis, following which only one of the sub-regions remains illuminated. The win value is either doubled or decreased to zero in dependence on which of the subregions remains illuminated.

After the user has operated the collect button 24, or after he has selected the gamble mode and increased his win value, the win value is added to the amount displayed in a credit display region 30, which records the total amount won by the player during a succession of games.

Occasionally the user is awarded a "nudge" operation whereby, after a reel-spinning operation, he can selectively "nudge" or index each of the reels 10 using the appropriate one of buttons 20 to attempt to achieve a winning result. The total number of permitted nudges is indicated by a display 32.

Once a game has been completed, including any gamble or nudge options which may be used, then, assuming that the display region 15 still indicates that there is some game-playing time remaining, the player can start a new game by operating the start button 16. While there is game-playing time remaining, this can continue so that an indefinite number of games can be played, the exact number depending to a large extent upon how quickly the player operates the various buttons of the machine.

When the game-playing time ends, if the reels are spinning they are halted and a win value is accorded to the player in dependence upon whether or not the reels are positioned such that a winning result is achieved.

At that time, the amount of credit indicated by the credit display region 30 is paid out in coins or tokens, and the credit value is cleared. This, however, is not essential. Instead, means can be provided so that the user can select whether to collect his winnings or to convert them into a further amount of permitted gameplaying time so that he can continue playing. As a further alternative, the player may simply leave his winnings in the form of a credit value and insert further coins so as to continue playing; he could operate the machine over a succession of separate game-playing periods before deciding to collect his winnings.

Whenever the display region 15 indicates that there is remaining game-playing time, the user can operate a time gamble button 34 which initiates the operation of the display region 28 in the manner referred to above. If as a consequence of this the sub-region marked "DOUBLE" remains illuminated at the end of the gambling operation, the amount of game-playing time is doubled; otherwise, it is decreased to zero.

Figure 2 shows one possible construction of the circuitry of the machine of Figure 1. In this construction the machine is controlled by a microprocessor 100, but clearly other arrangements, e.g. using hard-wired logic, are possible.

The microprocessor 100 is connected to data and address buses 102 and 104, respectively. The way in which the microprocessor 100 operates is determined by a program stored in a non-volatile memory 106, such as an EPROM, connected to the data and address buses 102 and 104.

The data and address buses 102 and 104 are also connected to a reel mechanism 108, which incorporates the reels 10 referred to above.

By applying appropriate addresses on the address bus 104, and by transmitting appropriate data on the data bus 102, the microprocessor 100 can control the number of pulses delivered to the driver motors of each of the reels and thereby cause the reels to rotate by a predetermined amount. Also the positions of the reels can be determined by data delivered to the data bus 102 by the reel mechanism 108.

The address bus 104 is connected to a device 116 for strobing the inputs 118 of the machine 2. The inputs 118 include the above-mentioned switches 16, 17, 20, 22, 24, 26 and 34, and connections to a coin and token validator which generates signals indicating the value of inserted coins and tokens.

Upon actuation of one of the inputs 118, an input device 120 delivers, via an input buffer 122, data to the bus 102 to indicate to the microprocessor 100 that a switch has been actuated or a coin or token has been inserted.

A random access memory 124 coupled to the address buses 102 and 104 is operable,

during use, to store such information as the positions of the reels 10, the amount of accumulated credit and the amount of remaining gameplaying time.

An output decode device 130 is coupled to the address bus 104 and transmits data received from the data bus 102 via a data buffer 132 to output device 134, including solenoids which are actuated to dispense coins and tokens, lamps on the machine to indicate different modes of operation, and the circuits used to drive the display regions 15, 19, 28, 30 and 32.

A sound generator 136 is coupled to the buses 102 and 104 so that the microprocessor can cause the generator to generate audio signals which are delivered to an amplifier 138 and then to a speaker (not shown).

A real-time clock 139 is also coupled to the buses 102 and 104. This is used by the microprocessor 100 for determining the gameplaying time. The clock is set to a value calculated by the microprocessor upon insertion of the coins, and automatically counts down in response to an instruction issued by the microprocessor upon operation of the start button 16. The microprocessor repeatedly checks the clock and updates the display region 15 and the remaining time value stored in the memory 124 in response to the output therefrom. It will be appreciated that various modifications are possible. For example, the timing can be performed purely under software control, whereby the contents of a memory region are regularly incremented or decremented as the microprocessor repeatedly executes a program loop. Alternatively, the clock 139 can simply act to produce interrupt signals at predetermined intervals, the microprocessor 100 responding to each interrupt signal by halting its main processing routine, executing an interrupt routine whereby the contents of a memory region storing game-playing time are updated, and then returning to the main processing routine.

As mentioned earlier, the counting-down of the game-playing time may be interrupted either automatically or under the control of the user to permit certain activities to be carried out without reducing this time. Indeed, it is possible for the machine to be arranged such that the game-playing time is decremented only while the reels 10 are actually spinning.

An address decoder 140 is coupled to the address bus 104, and is arranged to enable the devices selected by the microprocessor 100 for transmission or reception of data by means of enable lines (not shown).

Numerous further features can be added, and modifications made, to the embodiment described above. Some of these are set out below:

1. It is possible to provide a "carry-over" feature. This enables a user to elect to terminate his present series of games, and have an opportunity to add whatever game-playing time remains to the time credited to him in a subsequent operation which is started by the insertion of further coins. This may be useful when for example there is so little time remaining that the user feels he would be unlikely to be able to achieve a winning result. There may, however, be a penalty for taking this option. For example, the remaining time may be decreased before being carried over, or alternatively there may be a certain percentage chance that the time will be lost instead of being carried over should the user elect this option.

2. The machine may be arranged so that it can operate both in the manner described above, wherein a user is allocated a certain amount of time to play an indefinite number of games, and also in the conventional manner in which the user pays for a predetermined number of games.

A switch may be provided to alter the operation of the machine between these modes. This switch may be concealed, or it may be accessible to the user so that he can select whichever mode he desires.

3. There may be a minimum period for which a game must be played and/or a minimum interval between successive games so that there is a maximum limit on the number of games which can be played within a predetermined amount of time.

4. On certain occasions the user may desire that the reels not move during the playing of a game, because a winning combination of symbols is displayed on the win line 18. The machine may be arranged so that this can be achieved, even if the hold option mentioned above is not available. The player may accomplish this by operating the start and stop buttons 16 and 17 in such rapid succession that there is insufficient time for the reels to move. The machine may be arranged so as to assist this, by providing a slight delay between the operation of the start button 16 and the spinning of the reels.

5. The hold feature mentioned above may be replaced by a "respin" feature. In this case, the operation of one or more buttons 20 would cause the associated reel or reels to spin.

Thus, successive games may be played by operating selected buttons 20, instead of the start button 16. This respin option may be provided every time a game is played, or for each game except for the first game played at the beginning of the game-playing period, or on random or pseudo-random occasions.

6. In the above arrangement, the maximum number of winning results which could be achieved during the game-playing period increased with the speed at which the games are played.

Accordingly, by operating the game quickly and playing many games, a large amount of

winnings could be accumulated. It would be possible to arrange for the payout percentage to alter in accordance with the number of games played during any game-playing period, i.e. the machine could be arranged so that the chances of winning altered as the number of games increased. Either the payout ratio could be decreased to compensate for the increased number of games played, or could be increased so as to provide an even greater incentive for operating the machine quickly. Also, if the machine is of a type in which the percentage payout will depend upon the time taken for the game to be played (for example because the percentage payout reduces if the reels are spun by only a very small amount), means can be provided to compensate for this (e.g. by increasing the likelihood of obtaining a hold or respin feature).

7. The above embodiment has separate credit and time display regions 30 and 15 respectively.

However, this is not essential. There may for example be simply a time display region, and whenever a win value is achieved this can be converted into an appropriate amount of time and added to the remaining game-playing time.

At any time the user can choose to collect his winnings, whereupon the machine pays out an amount corresponding to the remaining game-playing time. If two separate displays such as 15 and 30 are used, the machine may have means whereby a user can at any appropriate time cause the machine to convert the amount displayed in the credit display to an appropriate time value which is added to the amount shown by the time display.

8. In the arrangement described above, a unit of time is allocated a fixed monetary value, so that the user knows how much time he will obtain by insertion of a predetermined amount of money. This is not absolutely essential.

The amount of time may be determined in a random or pseudo-random way in response to insertion of a coin, the thus-determined amount then being displayed to the user.

9. It was mentioned earlier that bonuses may be awarded upon certain occasions, as a result of which the remaining game-playing period may be increased. The amount by which it is increased may be fixed. Alternatively, there may be differing bonus amounts. One alternative may involve having a display showing a series of time bonuses which are awarded in turn. Each time the first of the displayed bonuses is awarded, the remainder of the bonuses are shifted by one position in the display, and a new time bonus added to the end of the series.

The displayed bonuses may have values determined by actual winning results previously achieved by playing the machine.

CLAIMS

1. A gaming machine which allows a user to play games for a predetermined period and wherein the duration of a game and/or the interval between games may vary, so that the total number of games played within the allowed period may vary.

2. A machine as claimed in claim 1, wherein the predetermined period is dependent upon the amount of a payment made by the user.

3. A machine as claimed in claim 1 or claim 2, including stop means whereby a user can stop one game to permit the playing of a succeeding game, so that the number of games played within the predetermined period will depend at least in part on how the user operates the stop means.

4. A machine as claimed in any preceding claim, including means for indicating the passage of time during the allowed playing period.

5. A machine as claimed in any preceding claim, the machine being operable upon certain occasions to alter the predetermined period by way of a bonus or penalty.

6. A machine as claimed in any preceding claim, wherein the machine is operable to increase the permitted period in response to the user playing a game and obtaining a winning result.

7. A machine as claimed in claim 6, including a credit display for displaying an amount won by the user, and means selectively operable by the user to cause the displayed credit amount to be reduced and the permitted period to be increased by an amount dependent upon that reduction.

8. A machine as claimed in any preceding claim, wherein the machine is arranged such that, during the predetermined period, the user can elect to be credited with an award in exchange for the unused part of the period.

9. A machine as claimed in any preceding claim, wherein the machine is operable upon certain occasions to halt the counting of the elapsed playing time so that the playing period is discontinuous.

10. A machine as claimed in any preceding claim, the machine being operable to display a plurality of sets of symbols which can be selected in different combinations in order to play a game.

11. A machine as claimed in claim 10, wherein each set of symbols is carried by a respective mechanical or simulated reel.

12. A machine as claimed in claim 10 or 11, wherein the machine is operable to allow the user at least on some occasions to select particular sets of symbols so that the displayed symbols thereof are not altered during the subsequent playing of a game.

13. A machine as claimed in claim 12, wherein the machine is operable to permit the user to perform said selection operation at least for each of the games following the first

game played within said predetermined period.

14. A machine as claimed in any preceding claim, wherein the machine is operable in a first mode to permit the playing of a predetermined number of games dependent upon the amount of payment made by a user, and in a second mode to permit the playing of an indefinite number of games within a predetermined period dependent upon the amount of payment made by a user.

15. A gaming machine substantially as herein described with reference to the accompanying drawings.

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Gaming machines

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None

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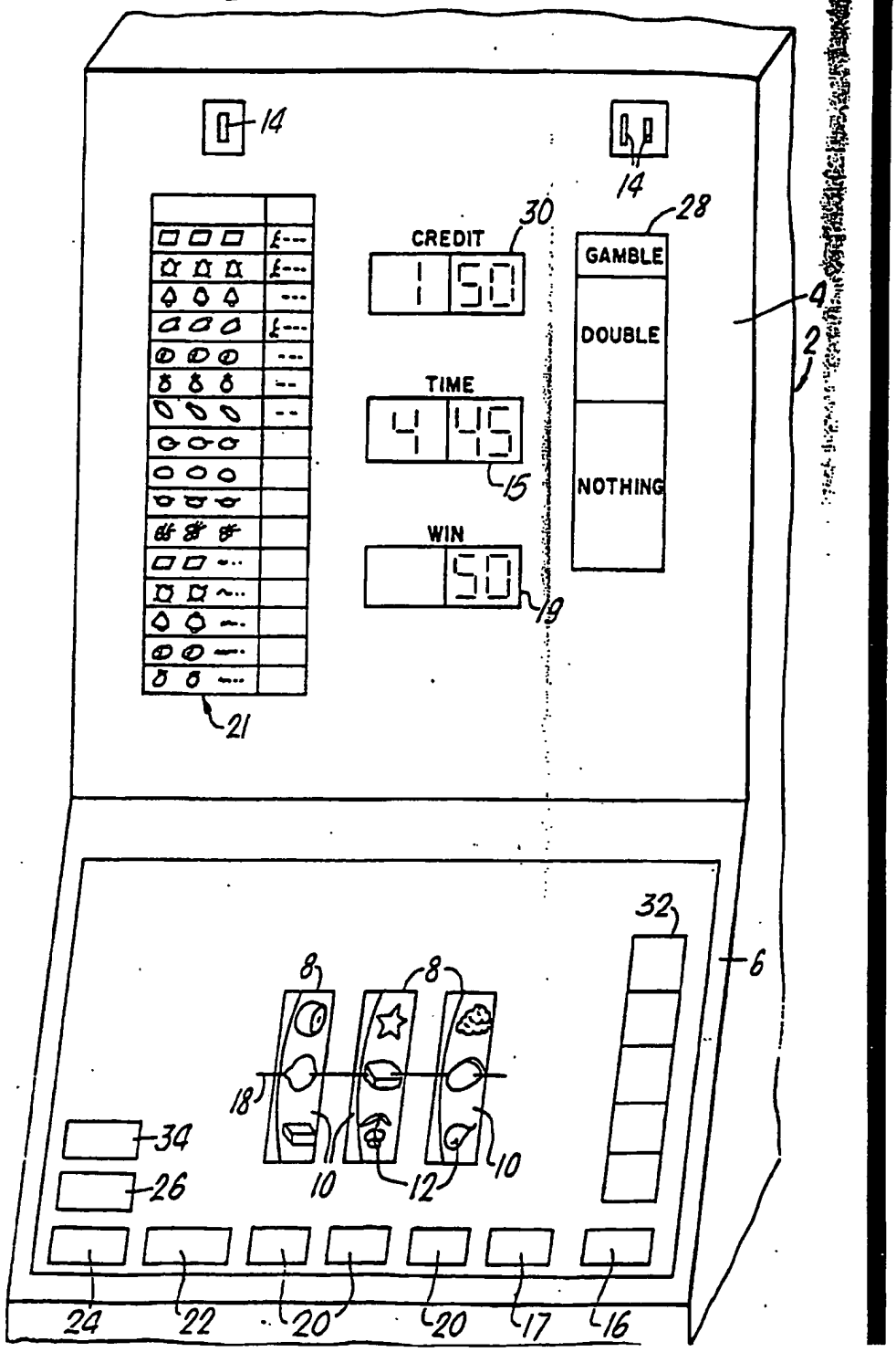
Fig.1.



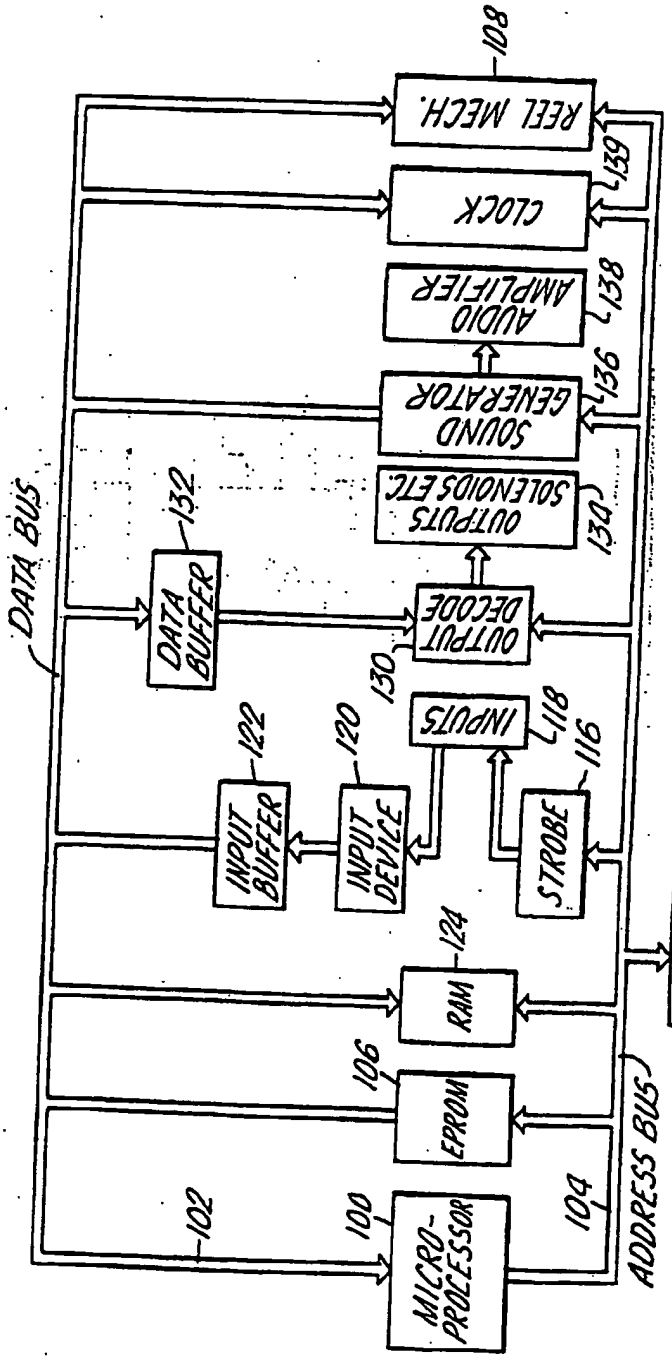

108
REEL MECH.
CLOCK
139
AUDIO AMPLIFIER
138
SOUND GENERATOR
136
OUTPUTS SOLENOIDS ETC.
134
OUTPUT DECODE
132
DATA BUFFER
DATA BUS
130
INPUTS
118
116
STROBE
122
INPUT BUFFER
120
INPUT DEVICE
124
RAM
DECODE
140
106
EPROM
102
100
MICRO-PROCESSOR
104
ADDRESS BUS

Fig. 2.

GAMING MACHINES

This invention relates to gaming machines, which term is used herein to refer to any device by means of which a user can play a game and, depending upon the results of the game, obtain a credit value. The machine preferably pays out cash and/or tokens in an amount corresponding to the credit value.

In the art, those machines which pay out only cash are referred to as "gaming machines". Herein, however, the term gaming machine is used in a generic sense, as the invention is applicable also to other types of machines such as those known as "amusement with prize" machines, which pay out both cash and tokens. The invention is particularly but not exclusively applicable to machines known as "fruit machines", which generally incorporate symbol-carrying reels which are spun during the playing of a game so as to alter in a random or psuedo-random manner the combination of symbols which can be viewed by the user. The invention is also applicable to machines which incorporate other forms of display, such as a panel carrying symbols which are selectively illuminated during the playing of a game, or a video

display screen which may display symbols such as playing cards or which may form part of a fruit machine which has simulated reels displayed on the screen.. Patent Specification GB-A-2,117,155, for example, describes a machine to which the present invention can be applied.

It would be desirable to provide an improved gaming machine which is more attractive to potential players, and which is so designed as to encourage use of the machine.

According to one aspect of the invention there is provided a gaming machine which allows a user to play games for a predetermined amount of time, and wherein the duration of a game and/or the interval between games may vary, so that the total number of games played within the allowed amount of time may vary.

According to another aspect of the invention there is provided a gaming machine which has means whereby a user can stop one game to permit the playing of a succeeding game, the machine being arranged to allow the user a predetermined amount of time within which to play games, so that the number of games played within the allowed amount of time will depend at least in part on how the user operates the stop means.

The invention is to a large extent directed to the idea of allowing a user a playing-time period within

which an indefinite number of games may be played, in contrast with the conventional arrangement in which the number of games a user is allowed to play is predetermined so that for example by paying a certain amount, the user is allowed a single game.

It is preferred that the number of games played within the allowed amount of time be determined at least in part by how the user operates the machine. For this purpose, the machine preferably has means (such as a "stop" button) for allowing the user to terminate one game and thus enable the machine to proceed with a succeeding game which can take place either automatically or in response to an action by the user (for example the pressing of a "start" button).

Such an arrangement is particularly desirable because the user will be encouraged to develop his skills in operating the machine in the hope of being able to increase the number of games he plays within the allowed time and thereby increase the number of opportunities to obtain a winning result.

However, this arrangement is not essential. Instead, the machine could be arranged to halt successive games automatically so that the user merely has to start the succeeding game, or indeed the machine could both stop and start the successive games automatically. In

these situations, the length of the game and/or the interval between games (or at least minimum values for these periods) are preferably determined on a random or pseudo-random basis by the machine.

In any of the above arrangements, the invention provides a machine so arranged that a player will wish the games to be played as quickly as possible in order to increase the number of opportunities to obtain a winning result, and this will tend to increase the overall useage of the machine.

In the preferred embodiment, a predetermined amount of playing time is obtained by making a payment equal to a certain value. This payment may be made by the insertion of one or more coins or tokens into the machine, although this is not essential. By making a larger payment, more playing time is allowed.

In an alternative embodiment, the machine normally performs in the conventional manner, so that the number of games played is determined only by the amount of payment made by the player, but on certain occasions a "timed play" feature comes into operation. This may occur on random or pseudo-random occasions, possibly before or after a conventional game, or may occur when a certain result has been achieved by the playing of a game. Upon occurrence of the feature, the user is

allowed a certain amount of time within which an indefinite number of games are played, following which the operation of the machine reverts to that of conventional machines.

The machine preferably has a display for indicating the passage of time during the allowed playing time. This display, which is preferably numeric, may either indicate elapsed time since the beginning of the playing period, or the time remaining to the end of the playing period.

The machine may of course incorporate various additional features such as are found in conventional machines and which are brought into play upon certain occasions which may be determined randomly or pseudo-randomly, or as a consequence of a certain result having been achieved by the playing of a game. Such features may include a "gamble" feature whereby the results of a win, which would normally be one of several predetermined credit values, can be gambled in an attempt to increase the amount won. If the machine is a fruit machine, the features may include a "nudge" feature whereby one or more of the reels of the machine are selectively indexed in order to change the symbols displayed in the hope of achieving the display of a winning symbol or combination of symbols. There could also be a "hold" feature whereby a user may select certain reels so that those selected

reels are not spun during the subsequent playing of a game.

If desired, in a fruit machine according to the invention, the arrangement may be such that each time a game is played during the playing period (or possibly each time except for the first) the user may select which reels are spun during the subsequent playing of a game. This could act as an added incentive, in that the user may be able gradually to build up a winning combination of symbols by the playing of successive games during the allowed playing period.

The allowed playing period need not be continuous. For example the allowed playing time may be split into different periods separated by intervals which do not count toward the playing time. Such an interval may commence automatically; for example, the counting of the elapsed playing time may halt automatically when the user obtains a win so that he may be allowed as much time as he likes to use an optional feature such as the gamble feature referred to above, following which the counting of the allowed playing time may recommence automatically. Alternatively, or additionally, there may be occasions on which the user can halt the counting of the playing time only by operating the machine in a required manner, such as by pressing a "stop-the-clock" button. This is

preferably only possible during the period between games, and is preferably only allowable so that a certain particular action (such as the use of one of the optional features referred to above) can be taken at leisure. Once the action has been taken, the machine preferably automatically recommences the counting of the playing time.

The machine may be arranged so that the playing time can be affected by various events. For example, time bonuses or penalties may be awarded on random or pseudo-random occasions, or as a consequence of a certain result having been achieved by the playing of a game. Alternatively, or additionally, there may be a "time gamble" option whereby a user may gamble his allowed playing time, so that the time is either increased or decreased as a result of a random or pseudo-random gambling operation. In the latter case, the counting of the elapsed game-playing time may be halted while the time gamble option is being used.

The counting of the playing time may start upon insertion of a coin or token, or alternatively may start when the user first initiates the playing of a game. At the end of the allowed playing time, the machine could be arranged so as to cancel any game which is presently in progress, or to terminate the game so that a result is achieved.

An arrangement embodying the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a gaming machine in accordance with the invention, and

Figure 2 is a block diagram of the circuitry of the machine.

The specific embodiment to be described is a version of the well-known "fruit machine". Many examples of such machines are readily available, and the way in which they operate is well-known to those familar with the art.

Referring to Figure 1, the machine 2 has a vertical facia 4 and an inclined facia 6. The facia 6 has three apertures 8, which reveal portions of the circumferences of three reels 10 which are mounted for rotation about a common horizontal axis. The reels carry symbols such as those shown at 12 on their peripheries, some of the symbols being visible through the apertures 8.

The machine can be played by inserting one or more coins or tokens through appropriate slots 14. This causes a time display region 15 on the facia 4 to display numerically a permitted amount of game-playing time, in terms of units and hundredths of a second, which is calculated in accordance with the value deposited by insertion of the coins or tokens. For example, 3 seconds may be permitted for each 10p inserted.

An individual game may then be played by pressing a start button 16. As soon as this is done, the machine starts to count down time, and to cause the display region 15 to indicate the decreasing amount of time. The pressing of button 16 also causes the reels 10 to spin, which is preferably achieved by using a stepper motor for each reel. The reels are then stopped by the user operating a stop button 17. If the reels are positioned such that certain symbols are aligned along a win line 18, the user is accorded with a win value. A win display region 19 on the facia 4 shows the amount won. A table 21 on the facia 4 shows the possible win values which can be achieved as a result of different combinations of symbols appearing on the win line 18.

Occasionally, a "hold" feature is provided whereby the user is given the opportunity at the beginning of a game to press one or more hold buttons 20, which will prevent, during the subsequent reel-spinning operation, the spinning of each reel associated with a hold button which has been pressed. There is a cancel button 22 for cancelling the selection of reels using the hold buttons to permit a different selection before the reel-spinning operation.

A "gamble" feature is provided each time the user obtains a winning result, whereby the user can choose

either to be credited with his winnings by pressing a collect button 24 or to enter a gamble mode, as a result of which his win value may be increased or decreased, by pressing a gamble button 26. In the latter case, a gamble display region 28 on the upper facia 4 is operated so as repeatedly and successively to illuminate sub-regions labelled "DOUBLE" and "NOTHING". This takes place for a time determined on a random or pseudo-random basis, following which only one of the sub-regions remains illuminated. The win value is either doubled or decreased to zero in dependence on which of the sub-regions remains illuminated.

After the user has operated the collect button 24, or after he has selected the gamble mode and increased his win value, the win value is added to the amount displayed in a credit display region 30, which records the total amount won by the player during a succession of games.

Occasionally the user is awarded a "nudge" operation whereby, after a reel-spinning operation, he can selectively "nudge" or index each of the reels 10 using the appropriate one of buttons 20 to attempt to achieve a winning result. The total number of permitted nudges is indicated by a display 32.

Once a game has been completed, including any gamble or nudge options which may be used, then, assuming that

the display region 15 still indicates that there is some game-playing time remaining, the player can start a new game by operating the start button 16. While there is game-playing time remaining, this can continue so that an indefinite number of games can be played, the exact number depending to a large extent upon how quickly the player operates the various buttons of the machine.

When the game-playing time ends, if the reels are spinning they are halted and a win value is accorded to the player in dependence upon whether or not the reels are positioned such that a winning result is achieved.

At that time, the amount of credit indicated by the credit display region 30 is paid out in coins or tokens, and the credit value is cleared. This, however, is not essential. Instead, means can be provided so that the user can select whether to collect his winnings or to convert them into a further amount of permitted game-playing time so that he can continue playing. As a further alternative, the player may simply leave his winnings in the form of a credit value and insert further coins so as to continue playing; he could operate the machine over a succession of separate game-playing periods before deciding to collect his winnings.

Whenever the display region 15 indicates that there is remaining game-playing time, the user can operate a

time gamble button 34 which initiates the operation of the display region 28 in the manner referred to above. If as a consequence of this the sub-region marked "DOUBLE" remains illuminated at the end of the gambling operation, the amount of game-playing time is doubled; otherwise, it is decreased to zero.

Figure 2 shows one possible construction of the circuitry of the machine of Figure 1. In this construction the machine is controlled by a microprocessor 100, but clearly other arrangements, e.g. using hard-wired logic, are possible.

The microprocessor 100 is connected to data and address buses 102 and 104, respectively. The way in which the microprocessor 100 operates is determined by a program stored in a non-volatile memory 106, such as an EPROM, connected to the data and address buses 102 and 104.

The data and address buses 102 and 104 are also connected to a reel mechanism 108, which incorporates the reels 10 referred to above.

By applying appropriate addresses on the address bus 104, and by transmitting appropriate data on the data bus 102, the microprocessor 100 can control the number of pulses delivered to the driver motors of each of the reels and thereby cause the reels to rotate by a pre-

determined amount. Also the positions of the reels can be determined by data delivered to the data bus 102 by the reel mechanism 108.

The address bus 104 is connected to a device 116 for strobing the inputs 118 of the machine 2. The inputs 118 include the above-mentioned switches 16, 17, 20, 22, 24, 26 and 34, and connections to a coin and token validator which generates signals indicating the value of inserted coins and tokens.

Upon actuation of one of the inputs 118, an input device 120 delivers, via an input buffer 122, data to the bus 102 to indicate to the microprocessor 100 that a switch has been actuated or a coin or token has been inserted.

A random access memory 124 coupled to the address buses 102 and 104 is operable, during use, to store such information as the positions of the reels 10, the amount of accumulated credit and the amount of remaining game-playing time.

An output decode device 130 is coupled to the address bus 104 and transmits data received from the data bus 102 via a data buffer 132 to output device 134, including solenoids which are actuated to dispense coins and tokens, lamps on the machine to indicate

different modes of operation, and the circuits used to drive the display regions 15, 19, 28, 30 and 32.

A sound generator 136 is coupled to the buses 102 and 104 so that the microprocessor can cause the generator to generate audio signals which are delivered to an amplifier 138 and then to a speaker (not shown).

A real-time clock 139 is also coupled to the buses 102 and 104. This is used by the microprocessor 100 for determining the game-playing time. The clock is set to a value calculated by the microprocessor upon insertion of the coins, and automatically counts down in response to an instruction issued by the microprocessor upon operation of the start button 16. The microprocessor repeatedly checks the clock and updates the display region 15 and the remaining time value stored in the memory 124 in response to the output therefrom. It will be appreciated that various modifications are possible. For example, the timing can be performed purely under software control, whereby the contents of a memory region are regularly incremented or decremented as the microprocessor repeatedly executes a program loop. Alternatively, the clock 139 can simply act to produce interrupt signals at predetermined intervals, the microprocessor 100 responding to each interrupt signal by halting its main processing routine, executing an interrupt routine

whereby the contents of a memory region storing game-playing time are updated, and then returning to the main processing routine.

As mentioned earlier, the counting-down of the game-playing time may be interrupted either automatically or under the control of the user to permit certain activities to be carried out without reducing this time. Indeed, it is possible for the machine to be arranged such that the game-playing time is decremented only while the reels 10 are actually spinning.

An address decoder 140 is coupled to the address bus 104, and is arranged to enable the devices selected by the microprocessor 100 for transmission or reception of data by means of enable lines (not shown).

Numerous further features can be added, and modifications made, to the embodiment described above. Some of these are set out below:-

1. It is possible to provide a "carry-over" feature. This enables a user to elect to terminate his present series of games, and have an opportunity to add whatever game-playing time remains to the time credited to him in a subsequent operation which is started by the insertion of further coins. This may be useful when for example there is so little time remaining that the user feels he would be

unlikely to be able to achieve a winning result. There may, however, be a penalty for taking this option. For example, the remaining time may be decreased before being carried over, or alternatively there may be a certain percentage chance that the time will be lost instead of being carried over should the user elect this option.

2. The machine may be arranged so that it can operate both in the manner described above, wherein a user is allocated a certain amount of time to play an indefinite number of games, and also in the conventional manner in which the user pays for a predetermined number of games. A switch may be provided to alter the operation of the machine between these modes. This switch may be concealed, or it may be accessible to the user so that he can select whichever mode he desires.

3. There may be a minimum period for which a game must be played and/or a minimum interval between successive games so that there is a maximum limit on the number of games which can be played within a predetermined amount of time.

4. On certain occasions the user may desire that the reels not move during the playing of a game, because a winning combination of symbols is displayed on the win line 18. The machine may be arranged so that this can be achieved, even if the hold option mentioned above is not available. The player may accomplish this by operating the start and stop buttons 16 and 17 in such rapid succession that there is insufficient time for the reels to move. The machine may be arranged so as to assist this, by providing a slight delay between the operation of the start button 16 and the spinning of the reels.

5. The hold feature mentioned above may be replaced by a "respin" feature. In this case, the operation of one or more buttons 20 would cause the associated reel or reels to spin. Thus, successive games may be played by operating selected buttons 20, instead of the start button 16. This respin option may be provided every time a game is played, or for each game except for the first game played at the beginning of the game-playing period, or on random or pseudo-random occasions.

6. In the above arrangement, the maximum number of winning results which could be achieved during the game-playing period increased with the speed at which the games are played. Accordingly, by operating the game quickly and playing many games, a large amount of winnings could be accumulated. It would be possible to arrange for the payout percentage to alter in accordance with the number of games played during any game-playing period, i.e. the machine could be arranged so that the chances of winning altered as the number of games increased. Either the payout ratio could be decreased to compensate for the increased number of games played, or could be increased so as to provide an even greater incentive for operating the machine quickly. Also, if the machine is of a type in which the percentage payout will depend upon the time taken for the game to be played (for example because the percentage payout reduces if the reels are spun by only a very small amount), means can be provided to compensate for this (e.g. by increasing the likelihood of obtaining a hold or respin feature).

7. The above embodiment has separate credit and time display regions 30 and 15, respectively. However, this is not essential. There may for example be simply a time display region, and whenever a win value is achieved this can be converted into an appropriate amount of time and added to the remaining game-playing time. At any time the user can choose to collect his winnings, whereupon the machine pays out an amount corresponding to the remaining game-playing time. If two separate displays such as 15 and 30 are used, the machine may have means whereby a user can at any appropriate time cause the machine to convert the amount displayed in the credit display to an appropriate time value which is added to the amount shown by the time display.

8. In the arrangement described above, a unit of time is allocated a fixed monetary value, so that the user knows how much time he will obtain by insertion of a predetermined amount of money. This is not absolutely essential. The amount of time may be determined in a random or pseudo-random way in response to insertion of a coin, the thus-determined amount then being displayed to the user.

9. It was mentioned earlier that bonuses may be awarded upon certain occasions, as a result of which the remaining game-playing period may be increased. The amount by which it is increased may be fixed. Alternatively, there may be differing bonus amounts. One alternative may involve having a display showing a series of time bonuses which are awarded in turn. Each time the first of the displayed bonuses is awarded, the remainder of the bonuses are shifted by one position in the display, and a new time bonus added to the end of the series. The displayed bonuses may have values determined by actual winning results previously achieved by playing the machine.

CLAIMS:

1. A gaming machine which allows a user to play games for a predetermined period, and wherein the duration of a game and/or the interval between games may vary, so that the total number of games played within the allowed period may vary.

2. A machine as claimed in claim 1, wherein the predetermined period is dependent upon the amount of a payment made by the user.

3. A machine as claimed in claim 1 or claim 2, including stop means whereby a user can stop one game to permit the playing of a succeeding game, so that the number of games played within the predetermined period will depend at least in part on how the user operates the stop means.

4. A machine as claimed in any preceding claim, including means for indicating the passage of time during the allowed playing period.

5. A machine as claimed in any preceding claim, the machine being operable upon certain occasions to alter the predetermined period by way of a bonus or penalty.

6. A machine as claimed in any preceding claim, wherein the machine is operable to increase the permitted period in response to the user playing a game and obtaining a winning result.

7. A machine as claimed in claim 6, including a credit display for displaying an amount won by the user, and means selectively operable by the user to cause the displayed credit amount to be reduced and the permitted period to be increased by an amount dependent upon that reduction.

8. A machine as claimed in any preceding claim, wherein the machine is arranged such that, during the predetermined period, the user can elect to be credited with an award in exchange for the unused part of the period.

9. A machine as claimed in any preceding claim, wherein the machine is operable upon certain occasions to halt the counting of the elapsed playing time so that the playing period is discontinuous.

10. A machine as claimed in any preceding claim, the machine being operable to display a plurality of sets of symbols which can be selected in different combinations in order to play a game.

11. A machine as claimed in claim 10, wherein each set of symbols is carried by a respective mechanical or simulated reel.

12. A machine as claimed in claim 10 or 11, wherein the machine is operable to allow the user at least on some occasions to select particular sets of symbols so that the displayed symbols thereof are not altered during the subsequent playing of a game.

13. A machine as claimed in claim 12, wherein the machine is operable to permit the user to perform said selection operation at least for each of the games following the first game played within said predetermined period.

14. A machine as claimed in any preceding claim, wherein the machine is operable in a first mode to permit the playing of a predetermined number of games dependent upon the amount of payment made by a user, and in a

second mode to permit the playing of an indefinite number of games within a predetermined period dependent upon the amount of payment made by a user.

15. A gaming machine substantially as herein described with reference to the accompanying drawings.